B.tech. IV Sem (CSE), 2018-19

Theory of Computation, Assignment # 2

February 20, 2019

Attempt ALL the questions.

1. Justify whether, following statements are true or false.

   (a) If L is regular, then $\{xy\}$ is regular, where $x, y \in L$.

   (b) If L is regular, then $\{y\}$ is regular, where $y = x^R$ and $x \in L$.

   (c) If L is regular, then L_1 is also regular for $L_1 \subseteq L$.

2. Use pumping lemma to show that following languages are not regular:

   (a) $\{ww^R \mid w \in (a+b)^*\}$

   (b) $\{a^n \mid n = 2^k, \text{ for some } k \geq 0\}$

3. Are the following propositions True or False?

   (a) If $L_1 \cup L_2$ is regular and L_1 is regular, then L_2 is regular.

   (b) If $L_1 \cup L_2$ is regular and L_1 is finite, then L_2 is regular.

   (c) If $L_1 \cup L_2$ is regular and $|L_1| = 1$, then L_2 is regular.

   (d) If $L_1 \cup L_2$ is regular and L_1 is finite, then L_2 is regular.

   (e) If $L_1 \cup L_2$ is regular and $|L_1| = 1$, then L_2 is regular.

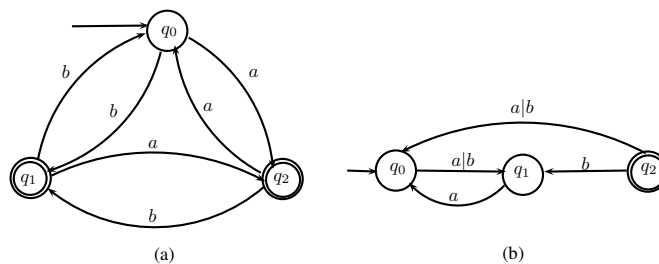4. Find out the regular expressions for the transition diagram shown in Fig. 1 (a), (b).

Figure 1: DFAs

5. Use the Myhill–Nerode theorem to prove that language $L = \{0^i \mid i \text{ is perfect square}\}$ is not regular.

6. Use table filling algorithm to find the equivalent reduced automaton for the one shown in Fig. 2.
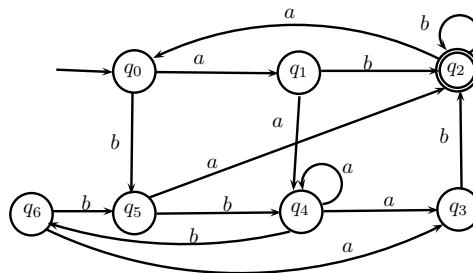

Figure 2: Finite Automaton

Submission deadline: March 02, 2019. Your answers must be hand written on A4 paper (only), then scan and submit through ERP, in pdf format only. Where answers are copied verbatim, 50% marks will be deducted for both the parties.